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Title: LENINGRAD INSTITUTE OF CHEMICAL PHYSICS, (LIKhpF) (USSR)

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LENINGRAD INSTITUTE OF CHEMICAL PHYSICS

(LIKhf)

Location:

1/4 Priyutskaya Ul., Lesnoy, Leningrad, 21.
Telephone: 89 (Lesnoy Exchange)

LIKhf is subordinate to the NIS TekhPROP NKTP.

Director:

Academician N. N. Semenov

Deputy Director:

V. A. Tikhomirov

LIKhf conducts scientific research work in the field of the kinetics of chemical reactions, elementary processes, surface phenomena, and the theory of solutions.

Scientific Laboratories:

Kinetics of Chain Reactions

Gas Explosions

Studies of the Reactions of Oxidation of Hydrocarbons

Combustion (Flame) Propagation

Solutions

Elementary Processes

Catalysis

Molecular Physics

Note: The Laboratory of Surface Phenomena by decree of the NKTP is taken out of the organization of LIKhf and is to become the independent Scientific Research Institute of Physical and Chemical Research with D. L. Talmud as its Director (NIFKhf).

Leading Scientific Personnel:

Prof V. N. Kondrat'yev - Chief of the Laboratory of Elementary Processes

Prof S. Z. Roginskiy - Chief of the Catalysis Laboratory

Prof S. A. Shchukarev - Chief of the Solutions Laboratory

Doctor of Physics - Yu. B. Khariton

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Docent A. V. Zagulin - Chief of the Laboratory of Gas Explosions
 Docent A. A. Koval'skiy - Dep Chief of the Laboratory of Chain Reactions
 Docent M. B. Neyman - Chief of the Laboratory of the Oxidation of Hydrocarbons
 Docent A. S. Sokolik - Chief of the Laboratory of Flame Propagation
 Docent A. I. Shal'nikov - Chief of the Laboratory of Molecular Physics

Total number of personnel	172
Scientific Workers	88
Budget for 1935	1,125,000 rubles

Basic Problems Dealt with by the Institute at the Present:

Chemical Kinetics (Under the general scientific supervision of Academician N. N. Semenov);

Establishment on the basis of the chain theory of general regularities of the course of chemical processes and the study of possible uses of new methods for controlling and accelerating chemical reactions - supervised by Academician N. N. Semenov;

Studies of the nature of catalysis;

Utilization of electrical discharges for the carrying out of chemical reactions - supervised by S. Z. Roginskiy;

Theory of Detonation;

Investigation of Combustion and Explosions supervised by A. V. Zagulin;

Kinetics of the dissolution of metals and the kinetics of ionic reactions - supervised by S. A. Shohukarev;

Surface Phenomena (at the Institute of Physical and Chemical Research);

Theory of the surface layer;

Application of the theory of surface layers to the problems of the strength of read constructions, artificial fibers, flotation, etc.;

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Basic Problems Dealt with by the Institute at the Present: (Con'td)

Work on linear adsorption and the theory of colloids with its application to plastics, artificial fibers, gelation, etc. - supervised by D. L. Talmud;

Elementary processes;

Utilization of contemporary physics and quantum mechanics for computing the structure of molecules and of elementary chemical acts;

Studies in the field of photochemistry - supervisor V. N. Kondrat'yev;

Enterprises and Institutions Served by LIKhF:

Industrial Enterprises

"Svetlana" Plant

"Pyatiletka" Factory for Synthetic Fibers

"Krasnyy Treugol'nik" Plant.

Institutes

Physico-Agronomical Institute, GIPKh; Hydrological Institute, NATI, VIAM.

Foreign Enterprises with which LIKhF Maintains Correspondance:

Physico-Chemical Lab, Oxford University, Oxford, England (Prof. Hinshelwood);

Physico-Chemical Lab, Cambridge University, Cambridge, England;

Chemistry Department, Manchester University, Manchester, England, (Prof. Polanyi);

Imperial College of Science, London, England (Prof. Townsend);

Institute of Physical-Chemistry, Berlin University, Berlin, Germany, (Profs. Badenstein and Schumacher);

Nobel Institute, Stockholm, Sweden;

Prof. Niels B'yerrum of the Royal Danish Scientific Society, Copenhagen, Denmark;

Department of Chemistry, Princeton University, Princeton, New York (Prof. Taylor);

Bureau of Mines, Experimental Station, Pittsburgh, Pennsylvania, (Dr. Bernard Lewis);

General Electric Research Laboratory, Schenectady, New York, (Dr. Languir)

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Stanford, Palo Alto, California (Prof. MacBain);

Technical Aid is Rendered by LIKhF on the Following Matters:

Methods for the determination of the sorption characteristics of catalysts;

Studies of the kinetics of specific catalysts;

Evaluation of the activity and range of catalysts;

Manufacture of acetylene from methane;

Microanalysis of gases;

Purification of sugar juices by microflotation;

Increasing the viscosity of oils (vol'tol');;

Detonation (knock) in engines;

Various indicator gauges;

Measurements of short time intervals;

Study of processes taking place within short time intervals;

Electronography of the surface layer of liquids;

Electronography of high polymer compounds;

Methods for measuring linear adsorption;

Methods for measuring the strength of adsorption layers;

Kinetics of the oxidation of hydrocarbons;

Anti-oxidants and inhibitors;

Effect of the power of the sources of ignition on the inflammability of mixtures;

Effect of additives on the characteristics of the ignition of gas mixtures;

Theory of the flotation process;

Artificial improvement of and creation of soil structures;

Increasing the strength of multiphase systems of road construction.

Periodical Publications:

The Institute does not have a publication of its own (1935), so that results of work conducted at the Institute are published in various

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Periodical Publications: (Cont'd)

special periodicals: *Physikalische Zeitschrift der Sowjet-Union*, *Acta Physicochemica URSS*, *Zhurnal Fizicheskoy Khimii*, *Doklady Akademii Nauk SSSR*, and others. Much of the work of the Institute is published in foreign periodicals.

The work of LIKhF is conducted along two main lines:

1. Study of general laws governing chemical reactions and clarification of reaction mechanisms in detail with the purpose of channeling reactions into the desired direction.
2. Studies of the properties of phase boundaries for the purpose of finding methods for changing the properties of colloidal systems.

The institute was the first to propose the chain theory of the kinetics of chemical reactions. This problem was worked on by Academician N. N. Semenov who was able to propose a theory of the inter-relationship of chain reactions.

Work by A. A. Koval'skiy on the kinetics of oxidation of hydrogen permitted determination of the velocity of reactions which take place in time intervals of the order of 0.1 seconds.

In the Laboratory of Elementary Processes V. N. Kondrat'yev is conducting work in the field of atomic physics. In 1935 this laboratory started work in the field of super-sonic oscillations, utilizing the most advanced optical devices in an investigation aimed at a understanding of elementary processes.

S. Z. Roginskiy is supervising a group of workers studying the various processes which take place during catalytic actions. Considerable data has already been accumulated clarifying the relationships between adsorption and chemical processes during the catalytic oxidation of CO in the presence of hopealite.

A. V. Zagulin in his studies of gas explosions has concentrated on research on the combustion of gas mixtures by a spark as well as

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by light and has further established a relationship between the intensity of the spark and light and the pressure of the gas mixture. It is planned that further research will be conducted in order to determine the details of certain regularities observed during gas discharges and to establish the underlying physical characteristics.

M. B. Neyman is conducting work on the oxidation of hydrocarbons. Special attention is being given to studies of the slow (passive) oxidation of hydrocarbons which are mixed with oxygen or air to the role of catalysts in inducing the reaction and the transition of the slow reaction into an explosion.

A. S. Sokolik is conducting research on the problem of flame and combustion propagation (particularly as it applies to the origin of detonations in a gas mixture).

S. A. Shchukarev in his studies in the field of solutions is attempting to determine the nature of solutions. He is approaching this problem not only from the thermodynamic point of view, but also under consideration of kinetic and quantum theory aspects.

Special mention must be made of work conducted by A. I. Shal'nikov in the field of molecular physics, specifically that related to finding good industrial methods for the preparation of colloidal solutions of alkali metals in organic solvents. These solutions are applied in the polymerization of synthetic rubber. A stable solution of this type was obtained for the first time at LIKhF.

In the field of surface phenomena, a very important step was taken by the formation of the independent Institute of Physical and Chemical Research under Corresponding Member of the Academy of Sciences D. L. Talmud out of the Laboratory of Surface Forces, LIKhF. Nevertheless, most of the theoretical work is still undertaken at LIKhF.

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-6-

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